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II. THE AFTER-TREATMENT OF HIP DISEASE.

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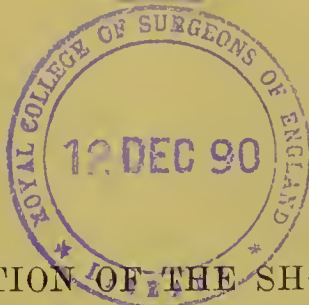
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THE PREVENTION OF THE SHORT LEG OF HIP DISEASE.

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A SHORT leg is what is commonly dreaded as the result of hip disease. The shortening is not, however, as a rule, due to shortening of the bones. What produces the short leg of hip disease is an immobilization of the joint which prevents the reduction of flexion of the thigh or adduction of the thigh, or which, as too often happens, prevents the reduction of both flexion and adduction. If, for instance, the patient stands with the thigh considerably adducted, we will say 22.5° , and fixed at that angle, the limb cannot be made vertical without elevation of that side of the pelvis, with of course a drawing up of the heel and an inevitable appearance of shortening. And if the thigh is flexed, for example 45° , and fixed at that angle the limb cannot be made vertical without an inclination forward, which gives an appearance of shortening to the whole figure. Thus we see that when the patient stands, adduction means "apparent shortening." The same is true of flexion. And when we direct our attention to the deformity which attends the patient when he walks, we see that the affected side dips at every step, and that when the limb comes into a vertical position, as it does at the critical moment when it is called upon to support the weight of the body, the pelvis rocks forward or laterally, or it may be in both directions at every step; and we have the characteristic gait of hip disease.

If on the other hand the thigh is immovable on the pelvis in a good position, neither adducted nor flexed, when the patient stands the limb is vertical and the pelvis is level in all directions; and when the patient walks, the pelvis without any lateral tilting rocks to and fro with a moderate motion, enough to allow the limb to swing back-

ward and forward by virtue of the mobility of the vertebral joints and the hip-joint of the unaffected side in the arc appropriate for locomotion in a comparatively easy and graceful way. Walking thus performed is attended with no dipping of the affected side, and with no shortening except what may come from shortening of the bones or "real shortening."

How to secure a good position of the limb in the hip-joint ankylosed by disease, is a question of great importance, second only to the question, How can we promote resolution of the inflammation? I believe a good ultimate position of the limb can be best sought by inducing the patient to use the affected limb as much as possible in walking of course, protected from concussion by the hip crutch.

I do not mean to say that traction is useless as an agent for overcoming deformity: it will diminish extreme deformity with absolute certainty, whether applied with the weight and pulley or the rack and pinion; but it is less effective when the angle of deformity is only moderate or slight. Applied, for instance, to an extreme case of flexion, it will produce extension. Indeed, traction, a few years ago, was universally called extension. But in proportion as flexion is reduced, the power of traction further to reduce the deformity rapidly diminishes, because it is evident that a given power loses its ability to overcome resistance at the angle as the angle becomes more obtuse.

If, for instance, we would straighten a crooked nail, we may, if the nail is very much bent, say at an angle of 90° , reduce the angle by traction; but as the angle becomes more and more obtuse, the power of traction to accomplish our object lessens, and finally disappears.

This consideration is one of those which lead me to discredit traction as a means of reducing deformity. Another is the fact that, although traction may, in skilful hands, overcome even slight degrees of deformity, it is only by assiduous attention and a nice adjustment of the direction in which the force is applied that this may be done. The corrected position of the limb thus brought about is maintained while the patient is under special supervision and restraint; but when they are relaxed, the causes, whatever they may be, which produce the deviation resume their influence. And this leads to the

inquiry, What are the causes which produce the customary deformity of hip disease? In other words, what flexes and adducts the limb?

This question is quite distinct from the question, What prevents motion? We know that motion is prevented, first, by reflex contraction of the muscles, and afterward by ankylosis; but what determines the position of the limb through the months and years when muscular action holds it fixed; what forbids a good position and inclines toward adduction and flexion? If one can discover the forces which cause the limb to err, we may perhaps remove or thwart them.

It has been said that effusion determines the direction of the limb, which takes that position in which the capsule can best accommodate the volume of fluid. Migration of the acetabulum and dislocation of the femoral head have also been cited as controlling forces. Abduction has been thought to depend on spasm of the gluteal muscles, followed by their paralysis, which allows their opposing muscles to produce adduction. Atrophy and attrition of the head and acetabulum have been thought to have some effect in deciding the character of the deformity. It has also been said that the limb takes that position in which an imaginary painful spot or area on the head of the femur is furthest removed from the depth of the acetabulum, where it would receive pressure from muscular action.

In some stages, and in certain cases, each of these modes of accounting for the chosen position of the limb may or may not be correct; but what we want is to recognize some cause, general in its application, and independent of such pathological conditions as have been cited, which are more or less transient and difficult to demonstrate in bone, muscle, nerve, or effused fluid. A more widely applicable theory is that which says the position is generally the attitude of minimum suffering; but pain is not always present—indeed, as a rule, it is present but a small portion of the time during which the limb is held in its selected position. Can we not find a cause which is in force in all periods of the affection, the painless as well as the painful?

It has been said, and wisely, that the position is due to the efforts made by the child and nature to secure fixation, and that the position assumed is that in which the immobilization of nature reaches its maximum. This is a good explanation, and is applicable to every

case in all its stages ; but I do not think these words quite cover the whole ground. I would add to them a line recognizing the influence exerted on the direction of the limb by the patient's habitual attitudes and movements.

Before accepting this addition, however, it will be necessary for us to accustom ourselves to recognize the fact that the fixation or immobilization created by reflex muscular action is very far from being absolute immobility—a view which is in accord with the ordinary events of practice. Cases in which fixedness is inconstant are matters of daily observation. For instance, a joint at the first moment of examination is without motion, but a few moments of delay and skilful manipulation reveal motion. Or, at one examination, the limb is in a position—adduction, we will say—at a certain angle, which is made a matter of record, and at the next examination, a few hours or days later, the angle is widely increased or diminished. Or, a patient with marked deformity is put to bed with a weight and pulley, or is treated by traction with the hip splint, and the deformity is greatly mitigated in a few hours. In all these cases reflex muscular action is in force, and yet it does not prohibit changes in the direction of the limb. The condition resembles that found in patients affected with a certain kind of paralysis, whose joints have been compared to a leaden pipe which retains its shape with a very positive degree of fixedness, but which can be bent by the application of a suitable degree of force.

In view of this mobility of the joint, fixed by reflex muscular action, I believe that the position assumed by the limb is dictated by the patient's efforts, both voluntary and reflex, to place the limb where its fixation will be liable to the least disturbance, and where it will afford him the most convenience in his ordinary attitudes and movements.

Before considering how to avert deformity, it is in order first to review the typical positions of the limb in hip disease. They seem to be three in number, and arranged chronologically as follows : (1) Abduction, which is produced early in the disease, when the patient seeks to favor the limb when he stands by putting his weight on the sound limb. He assumes the attitude which follows the military order "at rest," in which the limb is abducted, with a descent of the pelvis on that side, and apparent lengthening. Later in the

progress of the disease we have, (2) Adduction and flexion, caused by the patient's efforts to withdraw the affected limb from undue contact with the ground, and to make the disabled member as little an impediment as possible, while the chief work of progression is done by the sound limb. The natural rhythm of the gait is broken, the sound foot being on the ground longer than the other, and the affected limb is drawn up out of the way, when the foot is raised from the ground by an elevation of the pelvis on that side, with, of course, adduction and flexion of the thigh, and apparent shortening. Finally, in the neglected and bed-ridden patient we have, (3) Extreme flexion of the knee and thigh, and extreme adduction of the thigh, obviously the position in which the patient is most comfortable and the joint most free from disturbance.

These changes, taking place in a typical and uninterrupted case, but illustrate the mobility of the immobilization, so to speak, which characterizes hip disease. In passing, would it not be well to agree to call this form of immobilization "fixation," a term the status of which is not yet established, leaving the longer word to be applied to absolute immobility, such as accompanies ankylosis or bony union after fracture? We could also use the term fixation to indicate what we produce in the hip-joint by traction, which is not absolute immobility, but enough of immobilization to aid the natural efforts to keep the joint still and promote resolution, and yet not enough to stand in the way of desirable changes in the position of the limb.

To return to methods of averting deformity, the first position, that of abduction, seldom calls for attention in practice. It would in some cases be fortunate if slight abduction could be maintained as the ultimate position, because the apparent lengthening thus secured might happily compensate for whatever real shortening is entailed by the destruction or retarded growth of the bone. The third position, extreme flexion and adduction, cannot occur with the use of the hip-splint; and as we all, I presume, adhere to treatment by this apparatus, the practical question before us concerns only the prevention of the second position—that in which the thigh is seriously but not extremely flexed and adducted. How can we, then, by the use of the hip splint, keep the limb slightly flexed, and neither adducted nor abducted during the many months which usually inter-

vene between the first appearance of this position and the occurrence of ankylosis?

To recall what we have said about the cause of this deformity, it is the result of the patient's efforts to keep the affected limb off the ground while the well limb does most of the work of progression. If, then, we can induce the patient to adopt a gait in which the two limbs are used equally, the cause of the deformity would vanish. The affected limb would then reach for the ground at every step when its turn came, and that would mean a descent of the pelvis and the abolition of adduction, and this would be unattended with violence to the affected joint, because the weight of the body comes on the ischiatic tuberosity resting on the perineal strap, and not on the heel. The first, or an occasional effort of this kind, would not be likely to produce any effect, but if the effort is made habitual, or a matter of systematic drill, the adduction of the limb will be gently and gradually corrected, because the patient, consciously or otherwise, will incline the limb toward abduction, so that he can more readily conform to the mode of walking prescribed for him. Undue flexion is subject to similar corrective procedures. And if the naturally rhythmical action of the limbs is restored and becomes habitual, the limb, fixed in a good position by reflex muscular action, becomes immobilized by ankylosis, and the patient recovers with the minimum of deformity and locomotor disability.

It may be said, by the way, that the rhythm of the human gait is a subject which has not perhaps received the attention to which it is entitled. When natural, it is very simple—the time being divided equally between the two feet: but its very simplicity makes a slight deviation very noticeable, as in the lameness of incipient hip disease in a child, in whom the ordinary motions of the joint are as yet unlimited, and where lameness is entirely due to the fact that he violates rhythm by spending more time on the sound than on the affected limb. He accents the blow given to the ground by the well foot, which hastens to relieve the affected limb of the weight of the body. It is a point of practical importance that many people who are lame add to their lameness by neglecting to keep correct time with their feet. Any of us can appear lame by simply giving more time to one foot than the other, a matter of easy and immediate demonstration; and one

who is really lame can lessen the appearance of being so by simply giving natural rhythm to the action of the feet.

I have been led to the opinions¹ presented in this paper by pondering the question, Why do patients similarly affected, and treated exactly alike, recover with such different degrees of deformity? A young girl, for instance, was in the third stage, in which she nearly lost her life, before treatment was begun. She has recovered with no adduction and almost no flexion; so that although there is real shortening of nearly two inches, there is very little lameness. I attribute this good position to the fact that her mother was very anxious about her only daughter, and was always with her, so that every step the child took with the hip-splint was taken under the necessity of appearing as well as she could. Her steps were of equal length, and the affected limb became ankylosed in a useful position because it had to do, as far as was possible, half of the work of locomotion. I also treated a boy who recovered from the disease in a more moderate, although purulent, form; but he limps about most awkwardly with 20° of adduction, and 50° of flexion. I explain his bad position by the fact that his mother, one of the best of women, was busy out of the house every day, and nearly all day, necessarily leaving at home, and very much to their own devices, her family of four boys. As the patient was most of the time in excellent general health and very ambitious, he vied with his brothers in all their games, and developed his well limb enormously at the expense of the affected one, which was elevated and adducted to keep it out of the way. In another case, the patient, who recovered after long-continued purulent discharges, was a girl endowed with uncommon beauty; and although she was by no means docile, and under very little restraint at home, her vanity led her to try always to appear to the best advantage, and thanks to her careful gait and studied attempts to be graceful, she now walks with very little lameness, with flexion not more than 10° , adduction *nil*, and more than two inches of real shortening.

Another child whose treatment as a hospital out-patient was finally suspended on account of neglect, will probably recover with the limb

¹ Medical Record, May 21, 1887, p. 586. St. Louis Courier of Medicine, May, 1881, p. 372.

adducted 45° . A year before her final discharge she was made an in-patient and the deformity was entirely reduced by recumbency and the weight and pulley for seven weeks, but soon after returning to her home, where poverty and a large family make ordinary parental care impossible, the deformity recurred and will doubtless be confirmed.

These are the more striking examples selected from many cases the study of which has led me to the practical conclusions above expressed. I believe that for years I made a mistake by encouraging patients, protected by the hip-splint, to take part in the usual occupations of healthy children. One result was frequent chafing by the perineal straps, which at once destroys correct rhythm, because it is impossible for the patient to divide his weight equally between the well foot on one side, and the excoriated perineum on the other. It is my practice now to advise moderation in exercise, and especial attention to the manner of walking. I insist on the patient's keeping time in his steps so far as practicable, and lead him to adopt and maintain a proud bearing, keeping his head high and behind the vertical of the centre of gravity. A girl is told to practise deportment before the looking-glass, and a boy is advised to organize a juvenile military company, and to take command of it himself. The parents are informed of the importance of encouraging the child to adopt deliberate and graceful movements on all occasions. Since I have changed my practice in this regard, there has been an improvement in results, and I no longer am anxious as to the ultimate position except in those cases in which the patient is intractable, and the domestic management at fault.

It may be well to mention that, as in this method of regulating the position of the limb no account is made of the abductive power of traction by the hip splint, a perineal strap on the sound side is dispensed with. A single strap is more convenient, and has proved sufficient both as an ischiatic crutch and an agent for making counter-traction when the rack and pinion are used.

Summary.—The deformities of hip disease are caused by the patient's efforts so to place the limb that it shall be the least disturbed by, and afford him the most convenience in, his customary attitudes and movements. They are (1) abduction, (2) adduction and flexion, and (3) extreme adduction and flexion. The second posi-

tion is practically, by far, the most important, and is the only one considered in this paper. It is caused by the patient's elevating that side of the pelvis in order to take the limb off the ground, and to keep the affected limb out of the way of the well one, which is on the ground a longer time than the affected limb, and does most of the work of progression. The limb is maintained in the chosen position by reflex muscular contraction, which does not immobilize the joint, but fixes it in such a manner that changes in its position are readily made by the application of gentle but persistent force. It is proposed, therefore, to induce the patient, wearing the hip-splint, which protects the joint from the violence of walking, to divide the time on the ground equally between the two feet, or rather between the foot of the sound side and the ischiatic crutch on the affected side, with the expectation that adduction and flexion will be wholly or in part reduced, when the affected limb makes repeated efforts to reach the ground and do its share in locomotion. It is believed that the patient can be induced by precept and drill to adopt this change in the manner of locomotion, with the result indicated—a belief which is sustained by the observation that patients led by accident to walk in this way have recovered with a good position of the limb, and by the results of the adoption in practice of this method of preventing deformity.



II.

THE AFTER-TREATMENT OF HIP DISEASE.



THE AFTER-TREATMENT OF HIP DISEASE.

By A. B. JUDSON, M.D.,
NEW YORK.

THE removal of the splint is a very interesting and practical subject for consideration. Imperfect knowledge of the existing morbid anatomy, troublesome at all stages, especially baffles our judgment in convalescence. It is, of course, better to wear the splint six months too long than to take it off a week too soon. As it interferes but little with the patient's ability or convenience, no harm is done by wearing it for several months unnecessarily.

It is a good rule to remove the splint gradually, consulting not only objective signs but also the patient's wishes to a certain extent. Traction and adhesive plaster, at first agreeable because they stay the limb, after a time when disturbance of the joint is tolerated become irksome. When we see that the key is seldom used with effect, notwithstanding our instructions, we may proceed with deliberation and judgment to withdraw this part of the apparatus, relying on the ischiatic crutch for the remaining months and years—generally years—of treatment. When, later in the history of the case, all symptoms have been absent for a year, we may very gradually withdraw the ischiatic crutch, allowing freedom from it first for a few minutes at the morning and night toilet, and later for a portion of the day in the house, and later still for all the time when the patient is in the house, and afterward for limited excursions out of doors. Thereafter the splint is to be worn only when unusually long excursions are to be made, and finally it may be dropped altogether.

This gradual process should cover several months, during which we may watch for any indications of the necessity of retracing our steps in whole or in part. The great majority of patients remain

permanently well. There are exceptional cases, which mean recurrence or perhaps mistaken judgment at the time of suspending treatment. In such cases treatment should be resumed with as much earnestness and confidence as if the disease were beginning.

In regard to the increase of deformity after the patient has recovered I think it happens in a number of cases, leading to the wish that the ankylosis of hip disease were bony instead of fibrous. Referring to the views expressed in another paper read by me at this meeting of the Association, I think the means recommended for the attainment of a good position during treatment should be kept in mind and observed through life; that is to say, the patient, after as well as before recovery, should persevere in observing a naturally rhythmical gait, thus dividing the work of locomotion equally between the two limbs. In this way the impaired limb will be kept in a good position in order to enable it to meet the requirements made of it.

I am inclined to doubt the permanent efficacy of operations on the femur for the correction of any except the most extreme and indurated deformities. The angle established in the bone by operation is, of course, permanent; but I should fear that abduction and flexion would recur at the point of fibrous ankylosis unless the patient were led to assume a manner of walking in which the well limb, always enormously developed, would not monopolize the labor of progression. In favorable cases a combination of these two methods ought to be eminently successful.

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